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No. 1700

INSTRUCTIONS FOR MOUNTING USING, AND CARING FOR

BARBETTE CARRIAGE

MODEL OF 1893

FOR

10-INCH GUNS

MODEL OF 1888

FOUR PLATES

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William Crozier,
Brigadier General, Chief of Ordnance.

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INSTRUCTIONS FOR MOUNTING, USING, AND CARING FOR BARBETTE CARRIAGE, MODEL OF 1893, FOR 10-INCH GUN, MODEL OF 1888.

(FOUR PLATES.)

[The points in *italics* are of importance or concern the safety of the carriage and should be specially noted. The important changes are shown in bold-face type.]

GENERAL DESCRIPTION.

Principal Parts.—The carriage is of the center pintle form, designed for guns of model of 1888, and consists of the following principal parts, viz, base ring resting upon the concrete platform, traversing-roller system, racer, right and left chassis, top carriage, recoil and counter-recoil system, loading platform, projectile hoist, traversing, elevating, and retracting mechanism, and accessories, including ammunition truck, shot trays, and implements.

Base Ring.—The base ring is of gun iron in one piece, secured to the platform by bolts through the flange. The lower roller path is on its upper surface.

The base ring is provided with leveling screws of bronze, bearing upon steel thrust plates set upon the concrete. In some of the earlier carriages wedges and plates were furnished instead of leveling screws and thrust plates.

The pintle, rising from the center and forming part of the base ring, is a cylinder with a spiral oil groove on its outer surface.

Lugs projecting from the base ring form a support for the traversing chain-adjusting bolts.

Traversing-Roller System.—Upon the lower roller path rests a circle of forged-steel live, conical traversing rollers, held in place by two concentric distance rings. The distance rings are secured to each other by braces bolted between them and the system is held concentric with the pintle by flanges on the inner ends of the rollers.

The trunnions at each end of the traversing rollers run in bearings in the distance rings, these bearings being slotted through on the underside to permit assemblage.

Racer.—The racer is of cast steel. The upper roller path is on its under surface and rests upon the traversing-roller system. The racer also contains the pintle bearing, which fits over the base-ring pintle and is provided with a packed wrought-iron cover to keep out dust and water. On the top surface of the racer are the seats for the two chassis and brackets. Two cast-steel clips (one in front and one in rear) are bolted to the outer surface of the racer. These clips or guide hooks have lips which engage under a flange on the base ring. Between the clips is a dust guard which protects the traversing-roller system.

Chassis and Recoil Rollers.—The chassis are bolted to the racer. They are joined in front by a transom bolted to each chassis.

In U-shaped recesses at the top of each chassis are placed the recoil rollers, made of forged steel bushed with bronze and run on 2.5-inch journals of forged steel. These journals pass through both walls of the U-shaped recess in the chassis and are secured by being screwed into the inner wall.

The tops of the chassis rails are inclined 4° upward and to the rear. At the forward ends of the chassis there are lugs projecting upward through which the piston rods pass. Stops are placed on the chassis rails in front to limit the forward motion of the top carriage. The front surface of the projecting lugs is finished as a seat for a shield to protect the gunners. The chassis also contain bronze-bushed bearings for traversing, retracting, elevating, and projectile hoist shafts as well as the support for the crane mast and seats for various brackets.

Top Carriage.—The top carriage is made in one piece of cast steel. It consists of two side frames containing the beds for the trunnions of the gun and the recoil cylinders, united by a transom passing underneath the gun. The trunnion beds are bushed with bronze and each cap-square is dovetailed and secured by bolts. Grease cups attached to the upper end of the top carriage and connected to the trunnion-bed bushings by brass tubes, provide lubrication for the gun-trunnion bearings.

Flanges on the top carriages are clipped over corresponding flanges on the chassis rails.

Recoil Brake (Pl. III).—The cylinders are 9.5 inches in interior diameter, fitted each with a piston rod 4 inches in diameter, having a piston with a diametrical clearance of 0.02 inch in the cylinder. During the recoil the pistons remain stationary and the top carriage, with its recoil cylinders, is drawn over them. Approximately uniform resistance in the cylinders is obtained by the passage of the liquid from front to rear through varying orifices caused by throttling bars whose inner faces are curved. There are two throttling bars in each cylinder held in place by bolts passing through the walls of the cylinder. Each piston has two rectangular slots fitting over the throttling bars. The sectional areas of these bars are such that the orifices for the flow of the liquid vary with the position of the top carriage during recoil so as to obtain a nearly constant resistance in the cylinders.

The energy of recoil is taken up by the resistance which the fluid offers to being driven through the orifices. After recoiling, the gun returns to the firing position by the action of gravity, the slope of the chassis rails being sufficient to effect this motion.

A head of cast steel is screwed in the rear end of each cylinder.

The counter-recoil buffers are formed by bronze plugs attached to the rear cylinder heads and containing recesses 2 inches in diameter and 5 inches long, in which fit projections from the piston rods, having a diametrical clearance of 0.0095 inch. When the gun returns to the firing position, the liquid caught in these recesses can escape only through the small clearance, the arrangement acting as a hydraulic buffer or dashpot to check the velocity at the end of the return into battery.

At the front ends of the recoil cylinders there are the usual stuffing boxes with glands and followers. To secure equal resistance and equal fluid pressure in the two cylinders, their front or pressure ends are connected by a cored passage through the transom. In some of the carriages the cored passage is replaced by a copper equalizing pipe strapped to the front part of the transom and connecting the cylinders, this pipe being provided with an emptying coupling and plugs. Each cylinder is provided with one filling and one venthole, also with an emptying plug suitably placed.

TRAVERSING MECHANISM.—The carriage is traversed by a chain resting on a flange on the exterior of the base ring and coupled through its end links to two adjusting bolts passing through lugs cast on the outer vertical surface of the base ring below the roller path. By means of nuts on the adjusting bolts the chain may be given all necessary adjustment. In front of the carriage the chain passes over a sprocket wheel mounted on a vertical shaft located in the front guide hook, being held to the base ring by two guide pulleys running on vertical studs attached to the underside of the front guide hook, one on each side of the sprocket wheel. Motion is communicated to the sprocket wheel and the carriage from the traversing cranks by a suitable system of shafts and spur and bevel gearing. A brass azimuth circle attached by countersunk screws to a flange on the base ring is graduated to degrees, but the numbers are to be added after the carriage is in the emplacement.

A steel bracket bolted to the right chassis supports a brass azimuth pointer, the graduated part of which is in smooth contact with the azimuth circle. It has slotted holes to give it a lateral motion for adjustment, after which it is fixed in position by two dowels. The pointer is graduated so as to give a least reading of 0.05°.

Elevating Mechanism.—Pointing in elevation is obtained by a bronze rack bolted to the gun. A pinion mounted on a short cross shaft engages the rack. On the outer end of this shaft there is keyed a cup-shaped friction clamp fitting over a corresponding shaped hub located on the outside of a worm gear mounted on the elevating pinion shaft and brought to a bearing in its seat by a nut on the end of the shaft. *By this arrangement excessive stress on the elevating system is relieved during firing.* This worm gear engages in a worm splined upon a vertical shaft, on the lower end of which is splined a bevel gear which engages with a second bevel gear upon the main elevating shaft, which runs parallel to the top surface of the right chassis rail. This second bevel gear slides upon the squared section of this shaft, being carried back and forth during the recoil of the top carriage. The front end of the main elevating shaft is connected with the elevating cranks, one on each side of the carriage, by a train of shafting and bevel gears.

Elevation Disc and Pointers.—**The elevation disc consists of a circular wheel carrying the service and subcaliber range scales, which are graduated in yards. The elevation scale is graduated in 5° spaces. The elevation disc is inclosed in a case which is attached to the top carriage near the trunnion of the gun, and is actuated by means of a pinion and gear segment, the latter being secured to the gun trunnion by means of tap bolts.**

Retracting Mechanism.—For the purpose of maneuvering, and in order to ascertain from time to time whether the recoiling parts are in working order, the retracting mechanism has been provided. It consists of four double blocks, two of which are hooked to the front of the top carriage, while the other two are hooked to the rear of the chassis. A 2.25-inch manila rope runs through the blocks and the falls lead from the blocks to the retracting drums, which are keyed to the retracting-drum shaft, one at each end thereof.

To retract the gun the end of each fall is held by a cannoneer, after several turns have been taken with it around the retracting drum, and the latter is revolved by means of the retracting crank handles and intermediate mechanism until the recoiling parts are drawn to the rear a distance of 50 inches, which is the length of recoil allowed.

The motion of the retracting drums is caused by a worm wheel. This engages with a worm with triple threads keyed to a horizontal worm shaft parallel to the chassis, supported in bronze-bushed brackets bolted to the racer. At the opposite end of the shaft is a miter gear engaging with a miter gear on the horizontal crank shaft which extends through both chassis, being supported by bronze-bushed bearings in the chassis. There are two cranks for operating this shaft, one on each side of the carriage.

The carriage, after being retracted, must be allowed to run into battery gradually, by slacking the falls as evenly as possible on either side, since the barbette carriages are not provided with means for holding and tripping. *The blocks must be removed before firing.*

PROJECTILE HOIST, SHOT TRAYS, AND AMMUNITION TRUCKS.—At the rear of the left chassis a crane for raising the projectile to the gun is supported in a lug cast on the chassis. The fall of the hoisting tackle leads from the crane sheave over guide sheaves to a drum mounted on a short shaft passing through the left chassis. Motion is communicated to the drum by spur gears from a parallel short shaft carrying the hoisting crank. A pawl engaging in a ratchet wheel on the crank shaft holds the projectile at any height.

Seven shot tongs, one tray, and three ammunition trucks are provided with each carriage.

LOADING PLATFORM.—The loading platform consists of a steel plate supported at a convenient height for loading by four frames of T iron strengthened by gusset plates riveted to the frames. To prevent the gun from striking the platform in recoil the interior is cut out, except at the rear, and replaced by a sliding plate. This plate slides in guides bolted to the under side of the platform plate and is kept at the same distance from the breech of the gun by two connecting rods joining it to lugs on the top carriage. A rail of wrought-iron tubing supported by solid-forged stanchions extends around the loading and sighting platforms. To prevent injury to personnel during firing, due to the extension of the sliding plate beyond the platform, a guard is provided at the rear of the platform plate. A set of steps bolted to the platform gives access to it on each side. Steps and step hangers are fastened to each side of the racer to facilitate reaching the racer.

A sight standard of bronze is bolted to the rear part of the right chassis for the attachment of a telescopic sight to give azimuth only.

A sighting platform for the sight standard is attached to the loading platform in convenient position for sighting.

Traversing stops, placed on each side of the base ring, and a stop attached to the rear guide hook, limit the motion in azimuth in order to prevent the loading platform from striking the parapet.

MISCELLANEOUS.—There are plates on the carriage indicating the direction of motion of the cranks for elevating and traversing.

Drainage holes are drilled in all pockets, and all axles, trunnions, and sliding bearing surfaces are provided with oil holes having screw plugs.

In case of damage to the equalizing pipes on carriages Nos. 1 and 11, bronze plugs have been provided for permanently closing the cavities of the pipe connections.

The necessary tools and implements for each carriage are furnished packed in a chest marked with the number of the carriage.

ASSEMBLING THE CARRIAGE.

Implements.—The assembling requires machines and implements for mechanical maneuvers usually found at forts, but in addition to falls, blocking, jacks, sling chains, etc., shears or a derrick capable of lifting 14 tons will be found especially useful.

General Remarks.—The size and weight of the carriage permit it to be transported by rail partially assembled.

In assembling the carriage, as in all machinery, no parts should be directly struck with a steel hammer or sledge. Soft-metal drifts or copper or lead hammers should be used.

In unloading or handling the parts care should be exercised that the edges or finished surfaces do not become upset or burred. When two bearing surfaces are brought together, it is especially necessary that both parts should be absolutely clean, smooth, and well lubricated.

The following description gives a statement of the order in which the parts should be put together rather than complete enumeration of the details of the operations:

All machined parts, including all joints, keys, bolts, bolt holes, and working parts, should be thoroughly cleaned and oiled with some good lubricating oil before being assembled.

Base Ring.—The base ring can be lowered onto blocks over the platform by means of a derrick or moved on skids and rollers into position. When the holes in the base ring are directly over the corresponding bolts, lower by means of jacks until the ring rests on the platform with the bolts as nearly central as possible in the holes.

Leveling.—Eight bronze screws and eight steel thrust plates are provided for adjusting the level of the base ring. These serve to give the base ring proper support on the already well-set concrete and permit the grouting to become well set without deformation while the rest of the carriage is being assembled. *After the grouting under the base ring has thoroughly set, these screws should be unscrewed slightly to prevent their being overstrained in firing.*

A sensitive machinist's level and an accurate steel straightedge should be used in leveling all parts.

The threads of the platform bolts should be carefully examined to see that they have not been burred in the operation of lowering and to see that they are free from rust. After they have been put in good order, thoroughly oil the threads of both nuts and bolts before putting on the nuts. In screwing down the nuts on the platform bolts, take up on each a little at a time so that no part of the base ring will be strained. Great care should be taken in setting the base ring not to spring it.

In using the level it should always be reversed and the mean of the readings in the two positions considered the true reading. The leveling may be done from the top of the pintle surface, which is machine finished for that purpose, but should be verified by placing the straightedge on the inside edge of the turned surface of the roller path, following around circumferentially each way on this surface, leveling and tightening the foundation bolts.

The greatest care must be taken in leveling and setting the base ring, as the proper working of the carriage depends on the accuracy of this work.

After the base ring is properly leveled, pour under it a grouting of neat Portland cement.

DISTANCE RINGS AND TRAVERSING ROLLERS.—Clean the lower roller path very thoroughly, after which place the rollers and distance rings in position and run them around several times by hand to see that they work freely. If there is any unreasonable bearing it must be remedied before proceeding any further.

RACER, CHASSIS, AND TOP CARRIAGE.—As the carriage is received at the forts the racer, chassis, and top carriage will usually be assembled. The upper roller path, as well as the pintle surfaces on both racer and base ring, should be thoroughly cleaned and oiled, after which move the racer and assembled parts over the proper position by means of skids and rollers and then lower by means of jacks. The racer should be lowered carefully to prevent any binding of the pintle surfaces. Projections from the chassis rails in front and rear will enable jacks to be engaged. When the racer is down on the rollers move it around by hand to see that it moves freely. If the chassis and top carriage are not assembled to the racer, move the racer over its position as before. Thoroughly clean and oil all contact surfaces, bolts, keys, and bolt holes. Move the chassis rails to their positions and bolt them to the racer, being careful that the keys are in their proper positions.

Bolt the transom to the chassis. If the chassis are assembled properly, the bolt holes in the transom should correspond with those in the chassis.

Now lower the racer to the rollers as before. Before mounting the top carriage see that the recoil rollers are perfectly clean and that the pockets are free from sand. On account of the clips engaging over flanges on the chassis rails, the top carriage must be mounted from the rear. Raise it on blocking until it is high enough to engage and slide over the chassis rails. Move it forward on rollers, taking care to keep it at the same inclination as the chassis rails so that it will not bind. If the piston rods are assembled to the top carriage, they may be pushed through the holes in the lugs on the front of the chassis and secured by the two piston-rod nuts. If they are not assembled, they should be thoroughly cleaned and then inserted into the cylinder from the rear.

Traversing Mechanism.—Assemble to the front guide hook the traversing sprocket-wheel shaft with the sprocket wheel at the lower end and the bevel gear at the upper end properly keyed, after which bolt the front and rear guide hooks to the racer. Put in the spur-gear shaft from the outside with bevel gear inside and spur gear outside properly keyed. Insert the traversing-crank shaft with the pinion on the right side properly keyed on and put on the traversing cranks. The traversing chain may now be assembled and the guide pulleys attached to the front guide hook. *Be careful to have the traversing chain without kinks or twists.*

Elevating Mechanism.—Assemble the elevating apparatus, beginning at the top with the parts on the top carriage, and place the bearings, shafts, and gears in their proper places, putting in the miter gear which moves with the top carriage before the side shaft is assembled.

Retracting Mechanism.—Bolt the retracting hooks in their respective places, if not already on the carriage, place the worm shaft, the wormwheel, and the retraction drum shaft brackets in position and assemble the drums, wormwheel shafts, worm, and gears in their proper places, being careful that the keys and headless screws are properly located.

Projectile Hoist.—Assemble the projectile-hoist crank shaft with its drum, pawl bracket, and pawl. Mount the crane in its step and assemble its sheaves and hoisting tackle. Pass the end of the rope through a hole in the drum and fasten it on the inside.

Loading Platform and Other Parts.—Bolt the loading platform to the chassis and assemble all minor parts.

After Assembling.—After the carriage is completely assembled, the gun mounted, and the cylinders are filled with oil, retract the top carriage and allow it to go into battery several times to see that everything works properly.

Special Points to be Noted.—After the carriage has been completely assembled and the gun mounted, note that—

1. All bearing surfaces are thoroughly cleaned and lubricated, including the pintle surfaces and the teeth of all gears.
2. The traversing rollers all bear.
3. The recoil rollers turn freely by hand and their recesses are clean.
4. All oil holes are clean and free from grit and properly closed with screw plugs.

5. There are no burrs on the chassis rails to interfere with the motion of the top carriage.

6. The teeth of all traversing, elevating, retracting, and projectile-hoist gears are in good condition.

7. The stuffing boxes of the recoil cylinders are properly packed

8. The bolts through the walls of the recoil cylinders engaging the throttling bars are properly set up; also all filling plugs.

9. All pipe connections are properly set up and are tight.

10. The base ring of the carriage is level. This can be tested by traversing the carriage throughout its extent with a clinometer placed at the muzzle.

11. The name plate and direction plates are properly placed on the carriage.

12. The azimuth pointer remains in smooth contact with the azimuth circle while the carriage is traversed and all graduations are properly and neatly numbered.

13. The traversing rollers and paths are clean and free from rust.

14. The leveling screws of the carriage are in place and backed off so as not to bear on the thrust plates.

15. The elevation indicator is properly attached and correctly graduated.

16. The stops limit the motion in azimuth.

CARE OF THE CARRIAGE.

Carriages should be traversed from time to time throughout their entire allowed movement. The habitual position of guns on barbette carriages is "in battery," but at intervals the gun should be retracted and allowed to run again into battery, and should be elevated and depressed within the limits.

It is especially required that all parts of carriages be kept free from rust *at all times*. If this be allowed to accumulate its removal from all bearing parts, and especially piston rods, requires particular attention in order that clearances shall not be unduly increased.

The use of sandpaper for this purpose is forbidden, and emery cloth No. 1, being coarse enough for any ordinary rusting, should be used, the rust being softened, if necessary, by kerosene.

To Pack or Repack a Stuffing Box.—Examine the old packing and discard all unfit for use. If any of the old packing is used it should be put in after the new. See that the stuffing boxes are well cleaned and oiled.

Put on the piston rod one ring of 0.875-inch Garlock's "waterproof hydraulic" packing and force it well to the bottom of the stuffing box by a wooden stick and mallet. Treat each layer of packing in a similar manner, being careful to break joints until six rings of new packing have been inserted, or an equal amount of new and old when any of the latter is used. Place the gland on the follower, enter them together in the box, and screw up the follower.

No more force should be used on the spanner wrench than that of two men, and generally that of one man is sufficient. The addition of a pipe to the end of the spanner wrench should not be permitted.

The follower should be tightened from time to time. If the follower is screwed into the stuffing box too tightly, an unnecessary amount of friction will be produced on the friction rod. When the follower is screwed in until the flange strikes the box another ring of packing should be inserted.

It is to be expected that a slight amount of oil will soak through and drip from boxes of carriages when not in use. Also when tightening the followers a slight amount of oil will squeeze out of the saturated packing. This oil should be caught in the drip pan and not allowed to render the carriage unsightly.

TO REMOVE PACKING FROM A STUFFING BOX (using new extractor furnished by the Ordnance Department).—Retract the top carriage about 3 feet, unscrew the follower, and extract the gland, then close the extractor around the piston and insert the locking pin. When the needles or hooks are in contact with the packing turn the extractor to the *left*, pressing lightly downward at the same time, until the needles are firmly engaged in the packing. Then pull back on the handles of the extractors, still turning slowly to the *left*, until the packing reaches the threads of the stuffing box, when, unless the packing is quite loose, its further removal should be accomplished by unscrewing and so following the thread. It should be noted that the packing has been set hard against the walls of the stuffing box and the piston rod, and it will catch on the threads of the former, so that unless removed by unscrewing, as described, the packing is likely to be injured.

Extracting bars are provided to be used for starting the packing from its seat and steps are formed on the extractor in which the toes of the bars can engage.

FILLING RECOIL CYLINDERS.—The top carriage should be "in battery." To fill the cylinders with oil, remove for this purpose the four plugs, two in each cylinder. The rear ones on each cylinder are the vent plugs, and those directly in front of the vent plugs are the filling plugs. Pour clean neutral oil of specific gravity about 0.85 (such as the "hydroline" now issued to the service) into the filling hole in one cylinder until it flows out of the hole in the other. Allow any air that may be present to escape, then pour in more oil until the system is filled, and replace all plugs. About 34 gallons of oil are required. The working pressure in the cylinders is about 1,540 pounds per square inch.

INSTRUCTIONS FOR CLEANING RECOIL CYLINDERS.—Remove oil from cylinders and equalizing pipes.

Retract the gun until the pistons are in the middle of the cylinders; place hardwood planks 1 inch thick between the front ends of the cylinders and the counter-recoil stops so as to positively retain the top carriage in this position. Care should be taken that both planks are of equal length.

Remove the cylinder heads and both piston-rod nuts and carefully withdraw the piston rods from the cylinders. Each part dismounted should be tagged to insure its being assembled in its correct place.

Thoroughly clean the cylinders with kerosene oil forced from a hand pump into both ends of each cylinder. The plug in the emptying coupling should be removed and both branches of the equalizing pipe flushed out from their cylinder ends.[1] Then wipe the interior of the cylinders dry with clean cotton waste and clean the piston rods and cylinder heads.

Replace the emptying coupling plug, assemble the piston rods, nuts, and cylinder heads, exercising great care that none of the parts are burred or otherwise damaged. The cylinder heads should be firmly screwed into place, care being taken that the packing ring is in good condition and properly placed. Screw the followers tight against the packing in the stuffing boxes.

All parts dismounted should be carefully inspected to ascertain that they have been properly assembled. Retract the top carriage until both planks can be removed, then, by means of the retracting gear, allow the gun to return slowly into the firing position. After the cylinders have been filled with oil the gun should be retracted and allowed to run into battery several times to insure that all parts are in good working order.

SERVICE CONDITION (LUBRICATION, ETC.).—When the carriage is to be kept in readiness for service, and is in daily or frequent use, all bearing parts must be kept thoroughly cleaned and lubricated. Especial attention should be given to the lubricating of gun trunnions, rollers, pintle surfaces, shaft axle bearing, and sliding surfaces, and the elevating, traversing, hoisting, and retracting mechanisms, including the teeth of all gears.

The above parts should be lubricated at frequent intervals, whether the carriage is maneuvered or not, and it is essential for the proper preservation and working of the carriage that on every day on which it is to be maneuvered for any purpose all bearings should be well lubricated immediately before such maneuvering.

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[1] In carriages Nos. 2 to 10, inclusive, a cored equalizing passage connects the pressure ends of the cylinders. In these carriages the emptying plug at the middle of this passage should be removed and both parts of the passage flushed out as in the case of the equalizing pipe.

It will occasionally be necessary to examine all roller bearings to see that the dust guards are in proper place and that the rollers themselves are clean.

Recoil Cylinders.—Experience has indicated that the oil should not be removed from the recoil cylinders when carriages are to remain unused for a considerable period, as the walls of the cylinders soon become dry and then rust.

Oil Holes.—Oil holes, where provided, must be cleaned out frequently to keep them free from sand and grit, and will habitually be kept closed by the screw plugs provided, except when in the act of oiling.

Before oiling at any oil hole, wipe off carefully any dirt or grit near the opening that might be carried down into the bearing by the oil.

Compression Grease Cups.—Where compression grease cups are provided, similar precautions against dirt or grit must be observed. In filling these cups fill only to the bottom of the bevel at the top of the cup; if too full, the leather packing will not act effectively. In putting on the cap see that the leather-packed follower enters the cup without being caught, cut, or bent by the edge of the cup. Screw the cap down on the cup until the spring rod projects about ¼ inch above the top of the cap. Later, when the spring has recovered and has moved the follower forward, forcing the grease through the tube into the bearings, which will be indicated by the spring rod being pulled into the cap until its nut touches or nearly touches the cap, it will again be necessary to screw up the cap on the cup until the spring is again compressed. When the cap is screwed nearly home and the spring rod does not project, it is an indication that the cup should be refilled.

For further information regarding paints, oils, cleaning materials, and methods of using same, see Ordnance Department pamphlet, Form No. 1869.

List of articles packed in the armament chest for 10-inch gun, model of 1888, and barbette carriage, model of 1893.

FOR GUN.

1 bar screw driver for breech-plate screws.
3 bar screw drivers for breech mechanism.
1 tool for housing of crank catch.
1 obturator nut wrench.
1 obturator nut clamp screw wrench.
1 cleaning reamer for primer seat, 3 cleaning brushes for primer seat, in firing mechanism box.
1 pin punch.
1 tit wrench for obturator spindle.
1 pressure plug wrench.
1 ring for lifting breech-plate screws.

List of articles packed in the armament chest for 10-inch gun, model of 1888, and barbette carriage, model of 1893—Continued.

1 bronze drift, large.
1 bronze drift, small.
1 gunner's punch.
1 gunner's drill.
1 gunner's pouch.
1 pair gunner's sleeves.
1 gunner's lanyard.
1 metal scraper.
4 balls twine, assorted.
2 pounds copper wire, No. 12.
2 pounds copper wire, No. 16.
1 quire emery cloth, No. 00.
3 wagon sponges.
1 file, flat, dead smooth, 8-inch.
1 file, round, second cut, 8-inch.
1 file, half round, smooth, 8-inch.
1 file, 3-cornered, 8-inch.
1 copper hammer.
1 boiler-maker's hammer.
1 hand mallet.
1 long-handled mallet.
1 pair cutting pliers.
1 monkey wrench, 18-inch.
1 monkey wrench, 12-inch.
10 pounds cotton waste.
3 files, pillar, No. 6, 6-inch; 3 files, three cornered, No. 4, 6-inch; 3 files, half round, smooth, 8-inch; and 3 files, round, smooth, 8-inch, for use on bruised breech blocks; no other files to be used thereon.
1 box containing firing mechanism.
1 loading tray.
3 cleaning brushes for primer seat (in F. M. box).

FOR CARRIAGE.

1 spanner wrench for stuffing box gland.
1 box wrench for friction clamp nuts.
1 box wrench for elevating rack.
1 double wrench for chain connection and throttling bars.
1 bar wrench for rear cylinder head.
1 double wrench for ½ and ⅝ inch nuts.
1 double wrench for ⅞ and 1 inch nuts.
1 double wrench for ¾ and 1½ inch nuts.
1 single wrench for 1⅛-inch nuts.
1 single wrench for 1¼-inch nuts.
1 single wrench for 1⅜-inch nuts.
1 single wrench for 1¾-inch nuts.
1 single wrench for 2-inch nuts.
1 single wrench for 2½-inch nuts.
1 screw driver, commercial.
2 screw eyes for extracting follower in stuffing box.
1 screw driver for dust guard.
1 screw driver for journal of recoil roller.
1 crane block and rope.

List of articles packed in the armament chest for 10-inch gun, model of 1888, and barbette carriage, model of 1893—Continued.

1 oiler, locomotive, 1-quart.
1 oiler, ½-pint.

The following articles being too large are not to be kept in the chest:

1 box wrench for guide hooks.
2 wrenches for piston rod nuts.
2 water buckets, indurated fiber.

GASKETS AND PACKING.

1 set of gaskets for carriage.
12 rings Garlock's waterproof hydraulic packing 0.875 inch square and 4 inches inside diameter.

Weights of parts of 10-inch barbette carriage, model of 1893.

Number.	Name of parts.	Material.	Weight.
			Pounds.
1	Base ring	Gun iron	26,680
1	Racer	Cast steel, No. 1	10,345
2	Chassis	Cast steel, No. 2	15,048
1	Top carriage	do	9,157
	Elevating mechanism—		
1	Rack	Bronze, No. 3	90
1	Rack pinion	Forged steel, No. 3	15
1	Wormwheel	Bronze, No. 1	70
1	Wormwheel shaft	Steel	27
1	Worm	Forged steel, No. 3	31
1	Worm shaft	Steel	36
6	Miters	Bronze, No. 1	50
1	Vertical shaft for miter	Steel	15
1	Side shaft	do	70
1	Friction clamp	Forged steel, No. 2	16
1	Crank shaft	Steel	150
2	Cranks	Wrought iron	40
	Traversing mechanism—		
1	Chain	do	160
1	Sprocket wheel	Cast iron	61
1	Sprocket wheel shaft	Steel	58
2	Bevel gears	Bronze, No. 1, and steel, No. 2	97
1	Spur wheel shaft	Steel	50
1	Spur wheel	Bronze, No. 1	80
1	Spur pinion	Steel, No. 2	20
1	Crank shaft	Steel	140
2	Cranks	Wrought iron	40
2	Chain guide wheels	do	28
1	Front guide hook	Cast steel, No. 1	450
2	Chain connections	Forged steel	16
	Hoisting mechanism—		
1	Crane mast	Wrought iron	325
1	Block	Bronze and wrought iron	20
1	Drum	Cast iron	95
1	Drum shaft	Steel	24
1	Pinion	do	18
1	Crank shaft	do	23
1	Pawl	Wrought iron	8
1	Crank	do	19
1	Spur gear	Bronze	36
1	Ratchet wheel	do	8
20	Traversing rollers	Forged steel, No. 3	2,860
20	Recoil rollers	do	2,695
20	Recoil roller journals	do	375
1	Rear guide hook	Cast steel, No. 1	240
2	Piston rods	Forged steel, No. 3	785
1	Piston rod nut	do	50
2	Stuffing boxes	Bronze, No. 1	310
2	Rear cylinder heads	Cast steel, No. 2	284
4	Throttling bars	Forged steel	140
2	Distance rings	Wrought iron	750
10	Distance ring braces	Cast iron	130
2	Dust guards	Wrought iron	200
1	Racer cover	do	48
1	Loading platform	Steel plate	2,576
1	Sliding platform	do	475
1	Front transom	Steel, No. 1	610
	Bolts, nuts, etc		1,310
	Total weight of carriage		77,454

Names of the parts of the 10-inch barbette carriage, model of 1893, with their location and the material of which they are made.

Name of part.	Location.	Material.	Number.	Diameter.	Length.	Nuts.	Remarks.
				Inches.	*Inches.*		
Azimuth circle	Base ring	Brass	1				
Azimuth pointer	Azimuth pointer bracket	do	1				
Azimuth pointer bracket	Racer	Steel	1				
Base ring	On concrete platform	Gun iron	1				
Bolts, hexagonal head	Plug for filling holes	Wrought iron	2	1.25	2		Copper washers.
Do	Retraction drum shaft bracket and wormwheel bracket.	do	8	1	2.75		
Do	Trunnion cap to top carriage	do	4	1.25	3.75		
Do	Emptying coupling to top carriage	do	2	.75	1.5		
Do	Retraction worm shaft bracket	do	2	1	2.5		
Do	Chassis to racer	do	10	1.75	4.25		
Do	do	do	4	1.75	4.5		
Do	do	do	2	2	4.25		
Do	Bearing for crank shaft of elevating apparatus to racer.	do	4	1	2.375		
Do	Retraction wormwheel to drum	do	6	.75	1.5		
Do	Guide hooks to racer	Steel	6	1.625	5.875		Front.
Do	do	Wrought iron	4	1.625	5.875		Rear.
Do	Bracket for loading platform to chassis.	do	24	.875	2		
Do	Elevation disk case to top carriage	Steel	4	.75	2.375		
Do	Elevation disk cover to elevation disk case.	do	6	.5	1.5		Fitted.
Do	Gear segment to gun trunnion	do	3	.875	3		
Do	Retraction miter gears and shaft collars.	do	4	.5	.875		
Do	Brackets for square shaft to chassis	Wrought iron	4	.875	2.625 over all.		
Do	do	do	4	.875	2.375		
Do	Retraction hook to chassis	do	6	1	3.25		
Do	do	do	2	1	2.5		
Do	Transom to chassis	do	12	1.25	3		
Do	Braces for loading platform to chassis	do	4	1	2.5		
Do	Retraction hook to top carriage	do	4	1.25	3		
Do	Loading platform to chassis	Steel	8	.875	1.625		
Do	do	Wrought iron	24	.75	1.5		
Do	Loading platform to bracket	do	24	.75	2.125	24	
Do	Railing to platform	do	48	.625	1.125		
Do	Throttling bars to cylinders	Steel	36	.75			See details.
Do	Elevating rack to gun	do	2	1.125	3.625		8 threads per inch.
Do	do	do	2	1.125	4.25		Do.
Do	Leveling screws	Bronze, No. 3	8	2	3.75		See details.

Names of the parts of the 10-inch barbette carriage, model of 1898, with their location and the material of which they are made—Continued.

Name of part.	Location.	Material.	Number.	Diameter.	Length.	Nuts.	Remarks.
				Inches.	*Inches.*		
Bolts, hexagonal head	Stand for chassis sight to chassis	Wrought iron	4	0.75	1.875		
Do	Azimuth pointer bracket to chassis	do	4	.75	1.75		
Do	Step hanger to racer	do	4	.75	1.75		
Bolts, square head	Chassis to racer	do	14	1.75	6.25	14	
Do	do	do	4	1.75	6.75	4	
Do	Lower bracket for vertical shaft to chassis.	do	4	1	5.125		
Do	Upper bracket for vertical shaft to chassis.	do	2	1.125	5.125	2	
Do	Braces for loading platform to plate	do	4	.875	3.5	4	
Do	Step braces to platform	do	16	.75	1.875	16	
Do	Tie brace to T	do	8	.75	1.875	8	
Do	End brace to platform	do	8	.625	1.75	8	
Do	do	do	8	.625	2.25	8	
Do	Guard for sliding plate to platform	do	2	.5	3.25	2	
Do	Platform plate to T	do	14	.5	1.625	14	
Do	Steps to step hanger	Steel	4	.75	1		
Bolts, round head	Retraction blocks	do	8	1			
Do	do	do	4	.75		4	8 0.875-inch nuts: bolts special.
Braces for chassis sight platform	Loading platform	do	2				2.5 by 2.5 by 0.5 inch angles.
Braces	Retraction blocks	do	8				Fastened to outer cheeks by 0.19 inch rivets.
Do	Distance ring	Cast iron	10				
Bushing	Crane crank shaft on chassis	Bronze	2				
Do	Crane drum shaft on chassis	do	2				
Do	Crane mast on chassis	do	2				
Do	Elevating crank shaft bracket	Bronze, No. 1	2				
Do	Front guide hook	do	3				
Do	Top carriage and cap squares	Bronze	2				Made in halves and secured by 16 0.75-inch countersunk screws.
Do	Recoil rollers	Bronze, No. 1	20				
Do	Retraction drum shaft bracket	Bronze	1				
Do	Retraction worm shaft bracket	do	1				
Do	Elevating square shaft bracket	Bronze, No. 1	2				
Do	Traversing crank shaft, chassis	Bronze	2				
Do	Traversing spur wheel, shaft chassis	do	1				
Do	Lower vertical shaft bearing	Bronze, No. 1	1				
Do	Upper vertical shaft bearing	do	1				
Do	Worm shaft, top carriage	Bronze	2				
Do	For retraction drum in wormwheel bracket.	do	1				
Do	For retraction wormwheel shaft in wormwheel bracket.	do	2				
Do	Wormwheel shaft, top carriage	do	2				

Cap squares	Top carriage	Cast steel, No. 2	2				Bronze-bushed.
Chassis	On races	do	2				Right and left.
Cheeks	Retraction blocks	Steel	12				4 0.1875 inch thick, 8 0.25 inch thick.
Clevis	do	do	6				4 heavy, 2 light.
Counter-recoil buffer	Rear cylinder head	Bronze, No. 1	2				5 threads per inch.
Do	Piston	Forged steel	2				Do.
Crane block	On crane	Wrought iron	1				
Crane block sheave	In crane block	Bronze	1				
Crane block sheave journal	do	Wrought iron	1				1 0.25-inch stop pin.
Crane block sheave pin	In journal	Steel	1				1 0.25-inch split pin.
Crane crank	On crane crank shaft	Wrought iron	1				1 0.375 by 4.25 inch split pin, brass sheave.
Crane crank shaft	In bearings on chassis	Cold-rolled steel	1		28.375		2 0.375 by 0.5 inch keys.
Crane crank shaft collar	On shaft	Steel	1				1 0.375-inch tap pin.
Crane crank shaft nut	do	Wrought iron	1	1.5			1 inch high, standard.
Crane drum	On drum shaft	Cast iron	1				Right-hand grooves, 0.75-inch pitch.
Crane drum shaft	In bearings on chassis	Cold-rolled steel	1		25.5		2 0.375 by 0.5 inch keys.
Crane drum shaft nuts	On drum shaft	Wrought iron	2	1.5			1 inch high, standard.
Crane gear	do	Bronze	1				68 teeth, 4 per inch.
Crane guide sheave	In bracket	do	1				
Crane guide sheave bracket	Crane mast	Wrought iron	1				
Crane guide sheave journal	In guide sheave	do	1				1 0.1875-inch split pin.
Crane hook	In block	do	1				
Crane hook nut	On crane hook	do	1	.875			1.4 inches outside diameter, 0.75 inch high.
Crane mast	In crane brackets on chassis	do	1				4 inches outside, 2.72 inches inside diameter, wrought-iron pipe.
Crane pawl	On stud	do	1				
Crane pawl chain	On pawl	Brass	1				Twisted chain.
Crane pawl chain pin	On chain	do	1				
Crane pawl stud	In chassis	Steel	1				
Crane pawl stud nut	On stud	Wrought iron	1	.875			Standard.
Crane pinion	Crank shaft	Steel	1				16 teeth, 4 per inch.
Crane ratchet wheel	do	Bronze	1				
Crane pawl screw eye	Pawl	Steel	1	.25			
Crane rope	In blocks	Cast steel	1	.375	48 ft.		Hemp center, 6 strands of 19 wires each. Breaking strength, 9,000 pounds.
Crane rope hook	Crane rope	Wrought iron	1				
Crane mast washer	Crane mast	Bronze	1				
Crane mast sheaves	do	do	2				
Crane mast sheaves journal	Crane mast and sheaves	Wrought iron	1				1 0.25-inch split pin, 1 0.25-inch stop pin.
Crank fittings			5				Complete consists of 1 screw eye, 0.125 twisted chain and 1.375 by 3.25 split pin.
Direction plates for elevation	Chassis	Bronze	2				Right and left.
Direction plates for traversing	do	do	2				Do.
Distance ring	Traversing roller, inner ring	Wrought iron	1				
Do	Traversing roller, outer ring	do	1				
Dowel pin	Cover to case	Steel	2	.25	1.25		Driven.
Dust guard	On racer	do	1				In two sections.

Names of the parts of the 10-inch barbette carriage, model of 1893, witn their location and the material of which they are made—Continued.

Name of part.	Location.	Material.	Number.	Diameter.	Length.	Nuts.	Remarks.
				Inches.	*Inches.*		
Elevating cranks	On elevating crank shaft	Wrought iron	2				Sleeves, brass tubing.
Elevating crank shaft	In bearings on racer	Cold-rolled steel	1	2	122		1 0.4376 by 0.625 by 4.125 inch key.
Elevating crank shaft bearings	Racer	Cast steel, No. 1	2				
Elevating crank shaft collars	On elevating crank shaft	Forged steel	2				2 0.5-inch set screws.
Elevating friction clamp	Elevating worm wheel	Forged steel, No. 3.	1				
Elevating miters	On shafts	Bronze, No. 1	5				4 0.75 by 1 inch headless screws, 15 teeth, 1.25-inch pitch.
Elevating miter gear	On square side shaft	do	1				15 teeth, 1.25-inch pitch.
Elevating miter gear collar	On miter gear	do	1				1 0.25-inch taper pin.
Elevating rack	On gun	Bronze, No. 3	1				174 teeth on the circle, 1.75-inch pitch.
Elevating rack pinion	On worm wheel shaft	Forged steel, No. 3.	1				11 teeth, 1.75-inch pitch.
Elevating side shaft	In bearings on right chassis	Cold-rolled steel	1	2	84.8		1 0.4375 by 0.625 by 2.35 inch key.
Elevating square shaft bearings	Right chassis	Cast steel, No. 1	2				
Elevating side shaft collar	One side shaft	Steel	1				2 0.5-inch set screws.
Elevating vertical shaft for miters	In bearings on chassis	Cold-rolled steel	1	2	17.5		
Elevating vertical shaft bearing, lower	Right chassis	Cast steel, No. 1	1				
Elevating vertical shaft bearing, upper	do	do	1				
Elevating worm	On elevating worm shaft	Forged steel, No. 3.	1				Right-hand, 1.5-inch pitch.
Elevating worm shaft	In bearings on top carriage	Cold-rolled steel	1		33.9		1 0.4375 by 0.625 by 2.35 inch key, 1 0.75 by 1 inch headless screw, 1 0.4375 by 0.625 by 6.5625 inch key.
Elevating worm shaft nut	Elevating worm shaft	Steel	1				1.5 inches diameter by 1 inch high.
Elevating worm shaft ball bearings	do	Tool steel	2				4 washers, 2 brass rings shrunk on. Diameter of balls, 0.25 inch.
Elevating worm shaft collar	On elevating worm shaft	Forged steel	1				
Elevating worm shaft collar pin	On elevating worm shaft and collar	Steel	1				Taper pin.
Elevating wormwheel	On elevating worm wheel shaft	Bronze, No. 1	1				33 teeth, 1.5-inch pitch.
Elevating wormwheel shaft	In bearings on top carriage	Cold-rolled steel	1		26		1 0.4375 by 0.625 by 1.4375 inch key, 1 0.4375 by 0.625 by 2 inch key, 1 0.75 by 1 inch headless screw.
Elevating worm wheel shaft nut	On elevating worm wheel shaft	Steel	1				2 by 1.5 inches high.
Elevation disk	On elevation disk hub	White metal	1				
Elevation disk case	On top carriage	Cast iron	1				
Elevation disk case cover	On elevation disk case	do	1				
Elevation disk hub	On pinion	Bronze, No. 2	1				Riveted on elevation disk.
Elevation stop	Top carriage	Forged steel	1				
Emptying plug	Underneath top carriage	Steel	1	.75	1.25		Square washer head. Carriages 2 to 10, inclusive.
Emptying coupling	Between equalizing pipes	do	1				For carriages No. 1 and No. 11.

Emptying coupling unions	Connecting equalizing and emptying couplings.	Bronze	2				Do.
Emptying coupling rings	do	Steel	2				Do.
Emptying coupling washer	do	Vulcanized fiber	2				10 threads per inch.
Emptying coupling drain plug	Emptying coupling	Bronze	1				For carriages No. 1 and No. 11.
Emptying coupling nipple	do	do	1				Do.
Equalizing pipe	On top carriage connecting recoil cylinders.	Copper pipe	2 pcs.				About 4 feet long, ½ inch inside and 0.8125 inch outside diameter.
Equalizing pipe packing ring	Equalizing pipe	Steel	2				
Equalizing pipe reducing plugs	do	do	2				
Equalizing pipe unions	do	Bronze	2				
Equalizing pipe washer	do	Vulcanized fiber	2				
Equalizing pipe connection packing	Top carriage	Garlock waterproof hydraulic packing.	2				For carriages No. 1 and No. 11.
Extractors, screw eye	For extracting gland in stuffing box	Wrought iron	2				
Gasket	Rear cylinder head	Flexible vulcanized fiber.	2				
Do	Stuffing box	do	2				
Gear segment	On gun trunnion	Cast steel	1				270 teeth in complete circle.
Grease cups	Top carriage	Bronze	2				1 tap U. S. standard threads, 8 per inch.
Grease cup covers	Grease cups	do	2				
Grease cup pistons	do	do	2			2	2 0.125 by 1.375 inch split pin. 2 0.3125 by 0.5 screws.
Grease cup springs	On grease cup piston	Steel	2				
Grease cup piston washer	do	Bronze	2				
Grease cup packing	Fastened to piston	Leather	2				Cup leather.
Grease cup pipe	Top carriage	Seamless brass tubing.	2				0.25-inch wrought-iron pipe size, beaded, malleable-iron elbow.
Grease cup pipe gaskets	Grease cup seat in top carriage	Copper	4				
Guide hook, front	Racer	Cast steel, No. 1	1				
Guide hook, rear	do	do	1				
Implement box	With carriage	Wood	1				
Leveling screws	Base ring	Bronze, No. 3	8	2	3.75		
Leveling thrust plate	Under base ring for leveling screws	Steel	8				
Liners	Guides on top carriage	Tobin bronze	4				Fastened by means of 88 0.3125-inch screws
Loading platform	On chassis	Rolled iron	1				
Loading platform bracket	Chassis	Cast steel, No. 1	4				
Loading platform handrails	On loading platform	Wrought iron	6 secs.				1-inch wrought-iron pipe.
Loading platform steps	Loading platform	Steel	2				
Loading platform braces	Loading platform and chassis	Wrought iron	2				
Loading platform step braces	Loading platform	Steel	8				
Loading platform cross braces	do	do	2				
Loading platform frame	Chassis	do	4				3 by 5 by ½ inch angle.
Loading platform gusset plate	Loading platform frames	do	4				
Loading platform angle brace	Loading platform	do	1				
Loading platform filler piece	At rear of loading platform	Wrought iron	2				
Loading platform stanchion	Loading and chassis sight platforms	do	12				Solid forgings.
Name plate	Right chassis	Bronze	1				
Oil can	With carriage	Brass	1				1-pint.
Oil can with valve	do	do	1				1-quart.

Names of the parts of the 10-inch barbette carriage, model of 1893, with their location and the material of which they are made—Continued.

Name of part.	Location.	Material.	Number.	Diameter.	Length.	Nuts.	Remarks.
				Inches.	*Inches.*		
Oil plugs	In carriage	Bronze	28 22	0.375 .625			
Pins	Elevation disc to pinion	Steel	4	.437	1		Driven.
Pinion	On pivot	Forged steel	1				18 teeth.
Piston cover	On piston	Bronze	4				Fastened by 56 0.3125-inch countersunk screws.
Piston head	Piston rod	Forged steel, No. 3	2				
Piston liner	Pistons	Bronze	16				Do.
Piston rods	In recoil cylinders	Forged steel, No. 3	2	4	93		10 threads per inch.
Piston rods nut	On piston rods	do	4				2 3.5 inches diameter by 3 inches high, 2 3.5 inches diameter by 2 inches high; 10 threads per inch.
Pivot		Steel	1		6.875		1 Std. 625 nut at small end.
Plugs for cored equalizing pipe	Front on top carriage	Wrought iron	2	1.9			These plugs are used for permanent closing.
Plugs, cylinder	Equalizing pipe connection cavities	Bronze, No. 4	3				Method of permanently closing cavities in case of damage to equalizing pipe. For carriages No. 1 and No. 11.
Platform for chassis sight	Loading platform	Steel	1				
Pointer	On elevation disk case	Bronze	1				2 German silver strips pinned in place.
Pointer dowel	Pointer to elevation disk case	Steel	2	.187($\frac{3}{16}$)	1		.25 per foot taper.
Pointer screw	do	Bronze	2	.5	1		
Racer	On traversing rollers	Cast steel, No. 1	1				
Racer cover	On racer	Wrought iron	9				Fastened to racer by 0.625-inch countersunk screws.
Rear cylinder head	In recoil cylinder	Cast steel, No. 2	2				6 threads per inch.
Recoil rollers	Pockets in chassis	Forged steel, No. 3	20				
Recoil roller journals	In chassis	do	20	2.5	12		8 threads per inch.
Retraction blocks	With carriage	Steel	4				
Retraction block sheaves	In retraction blocks	Bronze, No. 3	8				
Retraction crank	On retraction crank shaft						No special crank. The elevating cranks are used.
Retraction crank shaft	In bearings on chassis	Steel	1		115		
Retraction crank shaft bushing	In chassis	Bronze	2				
Retraction crank shaft collar	On retraction crank shaft	Steel	1				1 0.5-inch set screw, hexagonal head, 1 0.5 by 0.5 by 5.75 inch key.
Retraction drums	On retraction drum shaft	Bronze, No. 3	2				Right and left.
Retraction drum shaft	In drum shaft bracket	Steel	1				2 0.5 by 0.5 by 3 inch keys, 2 0.75 by 1 inch headless screws.

Retraction drum shaft bracket	On racer	Cast iron	1				
Retraction hook, front	On top carriage	Cast steel, No. 2	2				Right and left.
Retraction hook, rear	On chassis	do	2				Do.
Retraction miter gears	On shafts	Steel	1 pr.				22 teeth, 4-pitch, 2 0.5-inch set screws.
Retraction rope	In blocks	Manila	2	2.25 circ.	60 ft.		0.625 galvanized W. I. hook and thimble, commercial, copper wire used for seizing rope.
Retraction worm	On retraction worm shaft	Steel, No. 3	1				Triple right-hand threads, 2-inch lead, 1 0.3 by 0.3 by 6.5 inch key.
Retraction worm shaft	In worm shaft bracket and wormwheel bracket.	Steel	1		40.5		1 0.5 by 0.5 by 2.75 inch key.
Retraction worm shaft bracket	On racer	Cast iron	1				
Retraction worm shaft collar	On retraction worm shaft	Steel	1				0.3-inch key fixed in collar; 1 0.5-inch set screw.
Retraction wormwheel	On left retraction drum	Bronze, No. 3	1				60 teeth, triple right-hand worm ¾ circular pitch.
Retraction wormwheel bracket	On racer	Cast iron	1				
Retraction wormwheel bracket cover	Wormwheel shaft	Steel plate, A. W. G., No. 5.	1				
Rivets	Piston liner and head	Brass	16	.375	5		
Do	Elevation disk to elevation disk hub	Bronze	12	.375			
Roller path (upper)	On lower roller path	Cast steel No. 1	1				
Roller path (lower)	Emplacement	Gun iron	1				
Screw driver, wooden handle	With carriage	Steel, hardened	1				
Screw driver	With carriage, for dust guard	Wrought iron	1				
Do	With carriage, for record roller journal	do	1				
Screws, cheesehead	Distance rings, together	do	10	1	14.875	10	Heads, 0.5 inch high.
Screws, countersunk	Covers to racer	do	68	.625	1.375 over all.		
Do	Lining of lateral bearing on top carriage.	Tobin bronze	88	.3125	.9375 over all.		
Do	Guard for sliding plate to platform	Wrought iron	2	.75	3.5 over all.	2	
Do	Guides for sliding plate to platform	do	18	.75	2.875 over all.	18	
Do	do	do	22	.3125	.75 over all.	Screw.	
Do	Platform plate to T	do	14	.75	1.875 over all.	14	
Do	Bushing to trunnion bed	Brass	16	.75	1.25 over all.		
Do	Piston cover to piston	do	56	.3125	.875 over all.		
Do	Guide wheel stud to front guide hook	Steel	1	.5			
Do	Direction plates	Brass	16	.25	.6 over all.		
crews, headless	Retraction drum to shaft	Steel	2	.75	1		
Do	Shaft for sprocket wheel	do	2	.75	1		
Do	Piston	do	2	.75	1		
Do	Miter gears and elevating pinion	do	5	.75	1		
Do	Pivot to elevation disk case	do	1	.5	.625		
Do	Pinion to elevation disk hub	do	2	.312($\frac{5}{16}$)	.625		

Names of the parts of the 10-inch barbette carriage, model of 1898, with their location and the material of which they are made—Continued.

Name of part.	Location.	Material.	Number.	Diameter.	Length.	Nuts.	Remarks.
				Inches.	*Inches.*		
Screws, round head	Wormwheel bracket cover	Wrought iron	8	0.375	0.75		
Do	Traversing stops and rear guide hook	Steel	2	1.25	2.5		
Do	Dust guard to racer	Wrought iron	40	.375	1		
Do	Collars to elevating crank shaft	Steel	2	.5	.875		
Do	Collars to elevating side shaft	do	2	.5	.875		
Do	Collar to traversing crank shaft	do	1	.5	.875		
Do	Bracket for guide sheave, together	Wrought iron	1	.75	2.25	1	
Do	Bracket for sliding plate	do	2	1.5	6.625	2	
Do	Sliding plate connection to top carriage	do	2	1.5	6.625		
Do	Azimuth pointer	Brass	2	.375	.75		
Separators (braces)	Between distance rings	Cast iron	10				
Separators, front blocks	Retraction blocks	Steel	4				
Separators, rear blocks	do	do	4				
Shot tongs	With carriage	Forged steel	7 prs.				
Shot tray	do	Steel plate	1				
Shot tray braces	Shot tray	Steel	2				Right and left.
Shot tray frame tie	do	Brass	1				
Shot tray liners	do	do	2				
Shot tray ring	do	Steel	1				
Shot tray ring top support	do	Brass	1				
Sight standard	Chassis, right side	Bronze	1				
Sighting handle	Top carriage	Wrought iron	1				
Sliding plate	In guides	Steel	1				
Sliding plate bracket	On sliding platform	Wrought iron	2				
Sliding plate connecting rods	Between sliding plate and top carriage	do	2				Wrought-iron pipe.
Sliding plate connection to top carriage	Top carriage	do	2			2	1.75-inch nuts, standard.
Sliding plate guide	Loading platform	Bronze	2				
Sliding plate guard	do	Forged steel	1				
Spring, spiral	On elevation disk hub, and fastened to elevation disk case by spring stud.	Spring steel	1	.75 wide	165		.078($\frac{5}{64}$) thick.
Spring stud	On elevation disk case, holding spiral spring.	Forged steel	1		2.625		
Steps	On step hangers	do	4				
Step hangers	On racer	do	2				
Stops, counter recoil	On chassis	Steel	2	.5 pipe plug.			
Stop pins	Retraction blocks	do	12				0.19 inch diameter by 0.5 inch.
Stuffing box bushing	In recoil cylinders	Bronze, No. 1	2				
Stuffing box followers	In stuffing box	do	2				
Stuffing box gland	do	do	2				
Throttling bars	Recoil cylinder	Forged steel	4				
Throttling bar bolts	In throttling bars	Steel	36	.75	2.45		Washer head; 36 0.05-inch lead washers.

Throttling bar bolt washers	On throttling bar bolts	Copper	36				
Top carriage	On chassis	Cast steel, No. 2	1				
Transom	Front of chassis	Steel, No. 1	1				
Traversing bevel gears	On shaft for sprocket wheel	Bronze, No. 1	1				34 teeth, 1.5-inch pitch.
Traversing bevel pinion	On shaft for spur wheel	Forged steel, No. 2	1				17 teeth, 1.5-inch pitch.
Traversing chain	Around base ring	Wrought iron	1				Length over 320 inches, 0.625 inch diameter of wire.
Traversing chain adjusting bolt	In lugs on base ring	Forged steel	2	1.5			Right-hand square threads, 4 per inch.
Traversing chain adjusting bolt nut	On adjusting bolt	do	2	1.5			Do.
Traversing chain adjusting bolt pin	In adjusting bolt	Steel	2				2 0.1875-inch split pins.
Traversing chain adjusting bolt washer	On adjusting bolt	do	2				
Traversing chain guide wheel	On guide wheel studs	Wrought iron	2				
Traversing chain guide wheel stud	Front guide hooks	Forged steel, No. 2	2	1.75			8 threads per inch; 2 0.5-inch countersunk screws.
Traversing chain guide wheel stud nut	Stud for guide wheel	Steel	2	1.5			Standard.
Traversing chain guide wheel stud washer.	do	do	2				2 0.25-inch lock keys.
Traversing cranks	On traversing crank shaft	Wrought iron	2				2 0.375 by 4.25 inch split pin; 2 brass sleeves.
Traversing crank shaft	In bearing on chassis	Cold-rolled steel	1		104		1 0.4375 by 0.625 by 5.5 inch key.
Traversing crank shaft collar	On traversing crank shaft	Steel	1				1 0.5-inch set screw.
Traversing stop	Rear guide hook	do	1				
Traversing stop pins	Base ring	do	2	2	5.1		End threaded, head slotted.
Traversing spur pinion	Traversing crank shaft	Steel, No. 2	1				19 teeth, 1-inch pitch.
Traversing spur wheel	Traversing spur wheel shaft	Bronze, No. 1	1				76 teeth, 1-inch pitch.
Traversing spur wheel shaft	In bearings on chassis and front guide hook.	Cold-rolled steel	1		34		2 0.45 by 0.65 inch keys.
Traversing rollers	On base ring	Forged steel, No. 3	20				
Traversing sprocket wheel	Traversing sprocket wheel shaft	Cast iron	1				
Traversing sprocket wheel shaft	Front guide hook	Cold-rolled steel	1		30		2 0.5 by 0.7 inch keys; 2 0.75 by 1 inch headless screws.
Wrenches	For piston rods	Steel	2				
Wrench, bar	For rear cylinder cover	Forged steel	1				
Wrench, box	For guide hooks	Wrought iron	1				
Do	For elevating rack	do	1				
Do	For friction clamp nut	Forged steel	1				
Wrench, double	For 0.5 and 0.625 inch nuts	do	1				
Do	For 0.75 and 1.5 inch nuts, chain connection and throttling bars.	do	1				
Do	For 0.875 and 1 inch nuts	do	1				
Wrench, single	For 1.125-inch nuts	do	1				
Do	For 1.25-inch nuts	do	1				
Do	For 1.625-inch nuts	do	1				
Do	For 1.75-inch nuts	do	1				
Do	For 2-inch nuts	do	1				
Do	For 2.5-inch nuts	do	1				
Wrench, spanner	For stuffing box gland	do	1				

Names of the parts of the 10-inch barbette carriage, model of 1893, with their location and the material of which they are made—Continued.

AMMUNITION TRUCKS, THREE TO A CARRIAGE.

Name of part.	Location.	Material.	Number.	Diameter.	Length.	Nuts.	Remarks.
				Inches.	*Inches.*		
Axle	On framing collars	Forged steel	1				
Bracket	Riveted on framing	Bronze	1				
Caster	On bracket	Cast steel	1				
Cartridge pans	On support	Steel plate	2				
Caster pin	In caster	Forged steel	1				2 0.25-inch split pins.
Caster wheel	On caster pin	Cast steel	1				Rubber tire.
Collars	On caster and axle	Forged steel	3				1 0.25-inch and 2 0.279-inch taper pins.
Framing collars	Riveted to framing	do	2				Right and left.
Handle	In upper frame	Ash					2 0.375-inch rivets.
Roller bushings	In caster and truck wheels		3				
Truck wheels	On axle	Cast steel	2				Rubber tires.

War Department,
Office of the Chief of Ordnance,
Washington, October 17, 1916.

March 10, 1906.
Revised January 7, 1908.
Revised April 13, 1912.
Revised October 17, 1916.
Form No. 1700.
Ed. Oct. 17—16—300.

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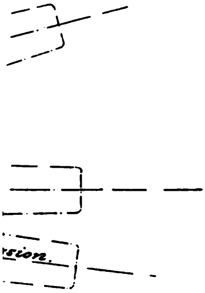
OCT 11 1917

PLATE I.



ed in the same
Carriage.

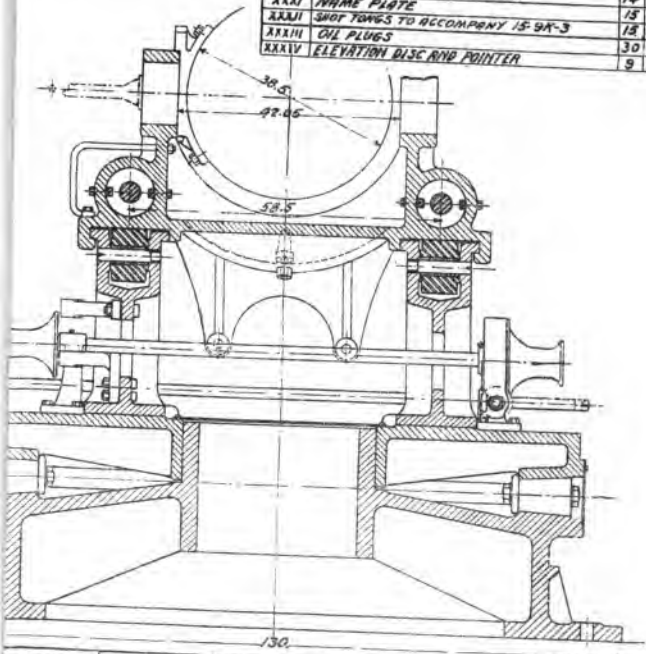
Approved. DW Fl
Brigadier G
Chief of Ord

William Crozier
Captain Ordnance Dept.

& J.f. Office of the Chief	Division 7	Drawing 24	File

Platform plate.

PLATE	LIST OF DRAWINGS.	CL.	DIV.	DR.
	PLATFORM PLATE	9	7	24
I	ASSEMBLED VIEWS	9	7	1
II	TOP CARRIAGE	9	7	2
III	CHASSIS	9	7	3
IV	UPPER ROLLER PATH	9	7	4
V	LOWER ROLLER PATH	9	7	5
VI	PISTON, STUFFING-BOX, RECOIL ROLLER.	9	7	6
VII	GUIDE HOOKS	9	7	7
VIII	SHAFT BEARINGS	9	7	8
IX	DISTANCE RINGS AND TRAVERSING ROLLERS	9	7	9
X	ELEVATING GEAR	9	7	10
XI	TRAVERSING GEAR	9	7	11
XII	CRANE	9	7	12
XIII	BOLT LIST	9	7	13
XIV	LOADING PLATFORM	9	7	14
XV	DIRECTION PLATES AND SIGHT STANDARD	9	7	15
XVI	THROTTLING BARS	9	7	16
XVII	IMPLEMENT BOX	9	7	17
XVIII	AZIMUTH POINTER AND STEPS	9	7	18
XIX	IMPLEMENTS	9	7	19
XX	RETRACTION GEAR	9	7	20
XXI	RETRACTION SHAFT AND BLOCKS	9	7	21
XXII	EQUALIZING PIPE. CARR. I AND II	9	7	22
XXIII	UNASSIGNED			
XXIV	GREASE CUP	15	OK	7
XXV	AMMUNITION TRUCK AND TRAY MODEL OF 1905	15	9K	3
XXVI	TELESCOPIC SIGHT MODEL OF 1898	15	2	38
XXVII	SIGHT BRACKET	15	2	12A
XXVIII	ELECTRIC NIGHT SIGHT	15	2	4
XXIX	BATTERY BOX FOR NIGHT SIGHT	14	3	8
XXX	LOCATION OF BATTERY BOX	14	3	4
XXXI	NAME PLATE	15	OK	3
XXXII	SHOT TONGS TO ACCOMPANY 15-9K-3	15	OK	8
XXXIII	OIL PLUGS	30	2	3
XXXIV	ELEVATION DISC AND POINTER	9	7	33



G PERTAINS TO			REVISIONS
	DIV	AS PLATE	
			NOV. 17, 1897
			DEC. 15, 1898
			JULY 20, 1899
			JAN. 11, 1901
			APR. 8, 1902
			JAN. 27, 1903
			AUG. 1, 1903
			NOV. 14, 1903
			JUNE 5, 1905
			JAN. 28, 1907
			JAN. 30, 1908
			SEPT. 14, 1909
			NOV. 3, 1909

10 INCH BARBETTE CARRIAGE
MODEL OF 1893
ASSEMBLED VIEWS

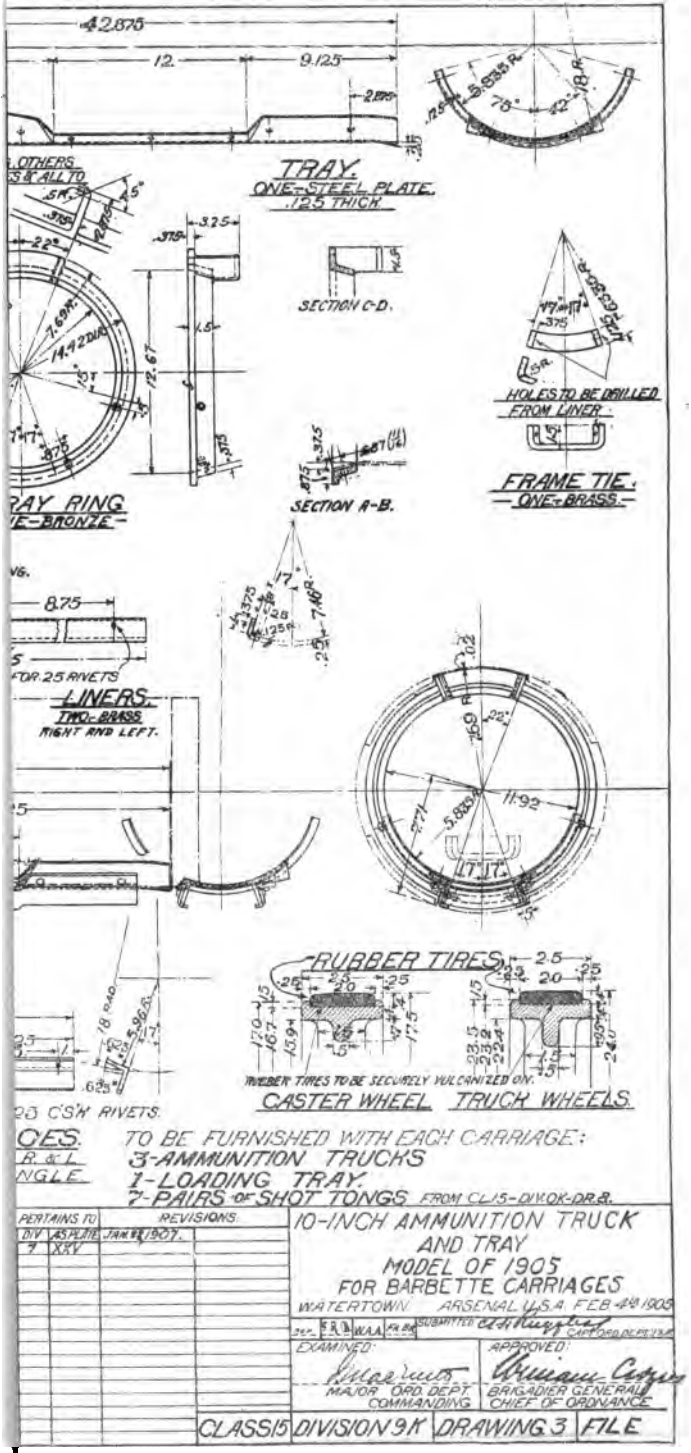
MARCH 14, 1894

SUBMITTED:
W.S.M. G.W.B. J.A.M.
MAJOR ORDNANCE DEPARTMENT, U. S. A.
EXAMINED:
MAJOR ORDNANCE DEPARTMENT, U. S. A.
APPROVED:
William Crozier
BRIG. GEN. CHIEF OF ORDNANCE, U. S. A.

CLASS 9 | DIVISION 7 | DRAWING 1 | FILE

PLATE I APPENDIX 15, 1909

PLATE IV.


42.875
12.
9.125
2.875
.35
OTHERS
S & ALL TO
TRAY.
ONE-STEEL PLATE.
.125 THICK.
5.835 R.
78°
42°
18 R.
.125
.5 R.
.375
45°
22°
3.25
.375
7.69 R.
14.42 DIA.
15°
12.67
1.5
.375
17°
.875
AY RING
E-BRONZE-
SECTION C-D.
SECTION A-B.
.875
.375
.687 (11/16)
HOLES TO BE DRILLED
FROM LINER.
FRAME TIE.
-ONE-BRASS.-
NG.
8.75
17°
7.46 R.
.1375
.28
.125 R.
.25
FOR 25 RIVETS
LINERS.
TWO-BRASS
RIGHT AND LEFT.
.02
22°
7.69 R.
11.92
5.835 R.
7.71
17° 17°
5°
25
-RUBBER TIRES-
2.5
2.0
.25
18 RAD.
5.965 R.
.625
RUBBER TIRES TO BE SECURELY VULCANIZED ON.
CASTER WHEEL
TRUCK WHEELS.
25 CS'K RIVETS.
CES.
R. & L.
NGLE.
TO BE FURNISHED WITH EACH CARRIAGE:
3-AMMUNITION TRUCKS
1-LOADING TRAY.
7-PAIRS OF SHOT TONGS FROM CL.15-DIV.9K-DR.8.
PERTAINS TO
DIV
AS PLATE
7
XXV
REVISIONS
JAN. 1907.
10-INCH AMMUNITION TRUCK
AND TRAY
MODEL OF 1905
FOR BARBETTE CARRIAGES
WATERTOWN ARSENAL U.S.A. FEB. 4th 1905
SRD
WAA
SUBMITTED
CAPT. ORD. DEPT. U.S.A.
EXAMINED:
MAJOR ORD. DEPT.
COMMANDING
APPROVED:
William Crozier
BRIGADIER GENERAL
CHIEF OF ORDNANCE
CLASS 15
DIVISION 9K
DRAWING 3
FILE

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